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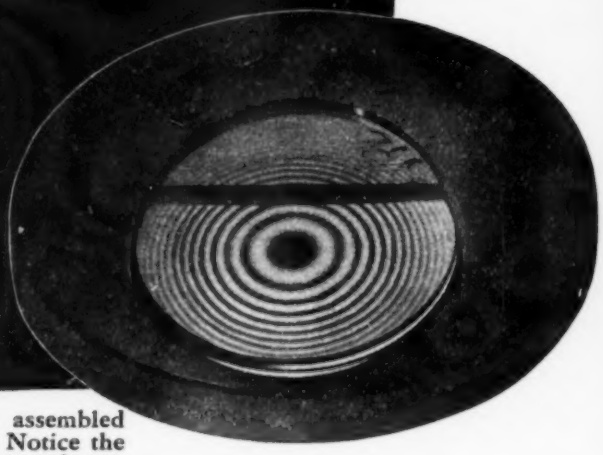

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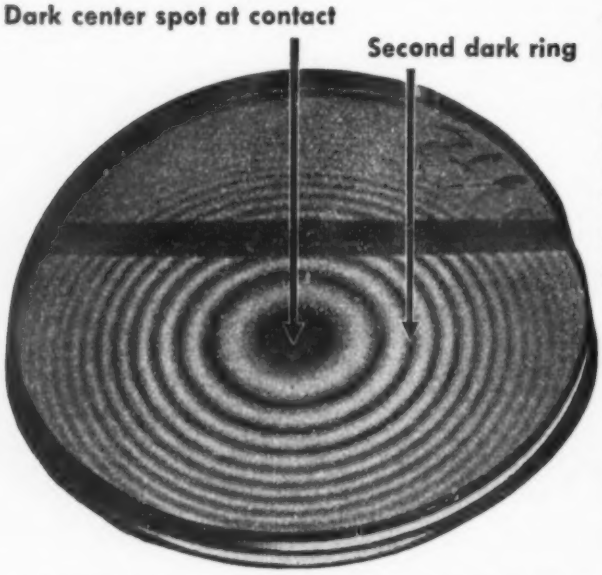

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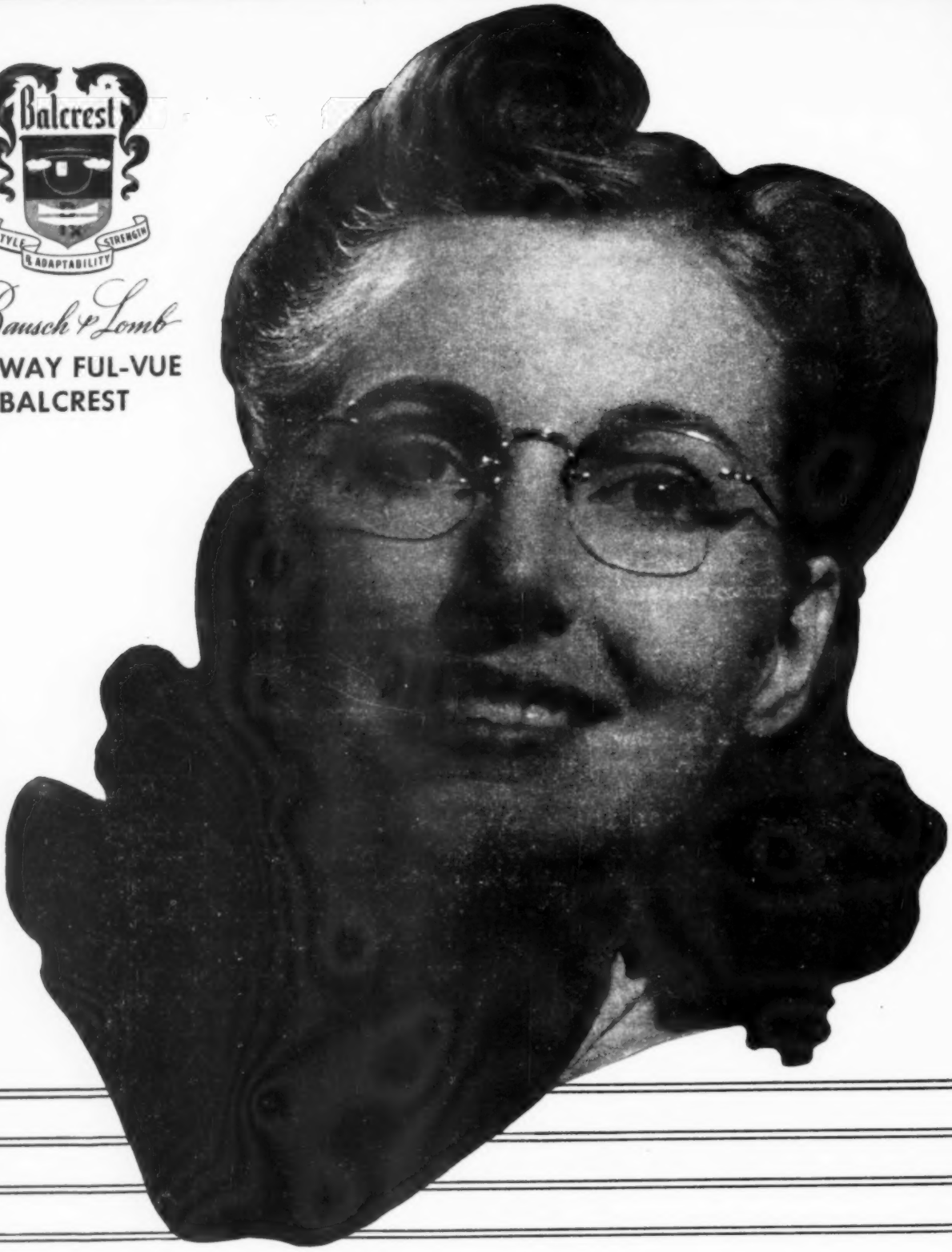

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ALTERNATING EXOTROPIA AND POSSIBLE LEFT CYCLOVERSION COMPLICATED WITH READING DISABILITY DUE TO ARRESTED ASSOCIATION ATTENTION REFLEX DEVELOPMENT*

William Smith, Opt.D., F.A.A.O.
Boston, Massachusetts

In the development of the binocular vision reflex two factors play important parts. These two factors are time and usage. Upon the time factor depends the development of those functions having to do with the unconditioned or innate reflex development. Those functions having to do with practice and conditioning depend upon the second factor, usage.

Pavlov, in his investigations into the conditioned reflexes has arrived at some very interesting observations and conclusions. Chavasse[1] applies some of these conclusions to the development of the binocular reflex in the child. The following quotation is taken from Chavasse's classic. This is included here for better comprehension of so complex a subject.

"If an ocular reflex is largely or entirely dependent for its development upon usage, then if there is no usage there is no development—even no reflex at all. An anatomical injury or pathological change will prevent a reflex. One reflex by excess or defect may interfere with another, or the external stimulus may be absent. In any case, the development of the reflex ceases. Nor need the early stages of the reflex process be interfered with. If just the final link in the chain is broken, it is enough. The climax, the normal achievement, is necessary for the further development of the reflex. If the animal is in any way denied the normal consummation, this normal 'reinforcement,' then, the development of the new reflex is arrested.

"What actually happens when a new reflex is prevented may be

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worse than the mere arrest at its existing stage of development. For in proportion as the reflex is of but recent and partial development, so, in addition to the arrest of further development does an actual dissolution, even to 'extinction,' of the reflex more easily and completely result.

"On the other hand, when a reflex has become old, it is disturbed with greater difficulty, even although still presenting in some degree the characteristics of a reflex dependent upon usage. And when it has become so old in the history of the race that it is transmitted to the offspring as an inborn, unconditional reflex, then its architecture develops independently of use and persists without it. Thus only an anatomical disaster—some gross interference with its arc—can abrogate the inborn, unconditioned reflexes. But mere cessation of effective stimuli is enough to extinguish the reflex which is conditional upon usage. In our study of the development of the binocular reflexes in the human subject we shall see that a reflex which is not present at all at birth may arise on a conditioned reflex, and so develop in strength and nicety as to attain for life and even before adult age is reached, the fixity of an unconditioned reflex; but not so early a fixity that it is transmitted to the next generation."

The case herewith presented is one clearly belonging in the category of arrested Association Attention reflex development. The various factors observed in the course of the numerous tests, further tend to prove how meager is our knowledge of the functions of the binocular apparatus and orthoptics, especially.

Figure 1. Patient L.R. Age 8. June, 1939.

L.R., age 8 years, 11 months, a second grade pupil, was referred for orthoptic consultation on June 12, 1939. From the story told by his mother it was learned that the boy was backward in his school work, especially in reading. He was very slow in forming simple monosyllabic words, and in many instances found it impossible to form simple sentences. The teacher had noticed that the boy was in the habit of covering his left eye after some reading. He was tilting his head and was very inattentive.

While still in the first grade, the teacher and school nurse called the matter of head tilting to the mother's attention. She, with great concern, consulted eye specialists, both privately and in clinics, without much success. The boy's school work was getting steadily worse and as a result, he spent two terms in the first grade, and was being kept in the second grade for another year. This despite the fact that L.R. was receiving private instruction in reading both from his mother and a hired teacher, but with little benefit.

No refractive examination was done at my office because the patient was referred by another eye specialist who submitted a report of his findings. An exhaustive orthoptic examination was made and the following data obtained: Visual acuity O.D. 20/20 O.S. 20/20. Fundi and pupillary reflexes to light and accommodation were normal. Ocular versions and rotations were smooth and extensive. The patient had alternating exotropia of approximately 15°, measured on the Perimeter and Maddox Tangent Cross, and left hypertropia of about 8°. He had alternating suppression. Retinal correspondence by the After-Image test was doubtful after several repetitions. Fusion at near and distance was absent. Spatial projection and fixation seemed unaffected. The projection test was done for the purpose of determining both spatial perception and macular fixation. For determining simple projection, the test object used consisted of a short vertical line drawn on a piece of card-board with pin pricks at the extremities of the line. (Maddox Test.)[2] The patient held this card vertically about six inches away from his eyes and he was asked to pass his hand behind the card and to superimpose his finger exactly upon the spot behind the vertical line which he was fixating. By this test his aim was accurate repeatedly, with either eye.

To determine spatial perception, we utilize a combination of several tests: (a) the cover test—each eye separately, and both being covered and uncovered simultaneously in an effort to produce simul-

taneous binocular perception. (A red glass filter was used in conjunction.) When this was established for a consistent period, we tried to localize the position of the second image. This was extremely difficult and we obtained no definite clue as to the patient's aptitude to spatial perception—even momentary. (b) By using the Maddox Rod Test (and a red glass filter), two dissimilar objects of unlike color were seen. The patient was asked to localize the band and the spot of light, and we in turn, tried to place the second image. As in the first test, the answers here, likewise, were vague and inconsistent.

Figure 2. Patient L.R. Age 8. June, 1939.

Although the boy, Figures 1 and 2, showed a definite hypertropia by observation, and on the Maddox Tangent Cross, it was impossible to verify it with the Keystone cards when he was looking straight ahead. The vertical tropia became manifested especially when the boy was looking down at some point of fixation. When this happened, one eye at a time would deviate outward, but the left eye alone would also seem to turn obliquely, a form of skew deviation somewhat akin to a cyclotorsion.

PHYSICAL CASE HISTORY: EARLY HISTORY: When L.R. was about one and a half years old, he had a severe attack of whooping cough. Since that time, however, aside from an occasional cold, the boy had been in good health. According to the mother, the extra ocular muscular condition became apparent soon after the whooping cough attack.

PRESENT CASE HISTORY: A physical examination was completed shortly before this consultation. The boy was found to be in good health. He was quite tall, well developed though rather thin. The reported ocular condition was the only manifested physical abnormality. According to I.Q. tests, the boy seemed of normal mentality for his age, but he was inattentive. He is a good swimmer, rides a two wheel bicycle well, and is a good skater. Early in the examination it was noticed that the patient was going to be uncooperative. He was argumentative and inclined to pugnacity. This may have been due to the fact that he was at least two years older than the oldest child in his grade and he was therefore extremely self-conscious.

Figure 3. Patient L.R. Age 10, June, 1941.

REFRACTIVE AND ORTHOPTIC DATA AND CASE HISTORY: Alternating exotropia and periodic left hypertropia. Reading difficulty—Read Gray Pre. No. 1 card in 28 minutes with each eye—numerous errors. (Normal reading for this card is 78 sec.—5 errors.) Refraction showed hypermetropia with hyperopic astigmatism. Static skiametry, O.U. +1.00 D. Sph. ⌒ +0.25 D. Cyl. Axis 90. Dynamic Skiametry at 20 inches O.D. +2.50 D. Sph. O.S. +2.75 D. Sph. ⌒ +0.25 D. Cyl. Axis 90. Subjective O.U. +0.50 D. Sph. 20/20. Accommodadation Amplitude O.D. 13D. (J. 1 type) O.S. 12D. (J. 2 type). Convergence near point—nil by push-up test.

Superimposition point at base-out position (instead of base-in as would be expected in a case where there is an external strabismus). There

was a marked increase of target separation when they were placed at "O" in the card holder or moved toward the base-in position. In spite of this, he was able to induce superimposition or diplopia at will. The boy showed no attention or association reflex functions.

The prevalence of faulty attention and association was determined after repeated tests performed by several different methods. In determining the quality of the association function, simple pictures were used with names describing the objects in one corner of the picture. The patient was asked first to look at a picture while its name was blocked out, then the name was exposed and the picture was blocked out. The purpose of this test was to have the patient associate the picture with its name. Blocks were used in a similar manner and for the same purpose. Likewise, simple drawings were used. Yet, at no time was the patient able to associate the pictures with their names when each was exposed alternatingly.

From the outset, it became evident that this was not a simple case and that the hyperexotropia was probably not responsible for the reading difficulty and for the faulty association and attention reflex. A training program consistent with the condition and one that would facilitate not only the training of the extra-ocular muscles, but also the development of normal association and attention reflexes, (and with it the elimination of the reading difficulty) was indicated. It was with this in mind that not one, but two training procedures were decided upon at the very start and finally one program containing the best features of each was used.

From the start O.U. +0.50 D. Sph. was prescribed for two weeks' constant wear. This correction was supplied to the patient without cost for the purpose of determining whether or not the uncorrected refractive error was in any way responsible for the condition. The first training procedure outlined consisted of the following steps: (1) Refraction. (2) Binocular Retinal Stimulation. (3) Projection Training. (4) Visual Acuity Training (P.P. & P.R.). (5) Accommodation Training. (6) Hand and eye Coordination Training. (7) Convergence Training. (8) Ocular Version and Rotation Training. (9) Accommodation and Convergence Amplitude Training. (10) Fusion and Duction Training. (11) Stereopsis Training.

Subsequently, however, this procedure was amplified to include the following steps: (1) Use of plus spheres for the relaxation of accommodation; with possible change to minus spheres for the stimulation

of accommodation and convergence (for one month of constant use). These to be followed by the use of base-in prisms for constant use. (This was to be a tentative prescription and 5△ prism diopters for each eye was to be the starting power.) (2) Base-in and base-out calisthenics for duction amplitude training. (3) Training for the development of the attention and association reflex. (4) Macular fixation and projection training. (5) Reading training. (6) Ocular versions and rotations training; repeated checking of retinal correspondence by the After-Image test was ordered.

Training was started on June 13, 1939. Before actual work was commenced, the patient's eyes were photographed for the orthoptic record.

Figure 4. Patient L.R. Age 10, June, 1941.

At the start, training was confined to binocular retinal light stimulation and visual acuity training of the left eye only on the Keystone V.A. 2 cards. The right eye was occluded. The visual acuity on both number and Snellen cards was 20/20, each eye. He was given near point reading on large type story books. As the patient was not able to form words or sentences, his near vision training consisted of picking out individual letters and naming them. The purpose of this procedure was to train and develop visual orientation, perception, and attention-association reflex. Fixation and projection training were given on the Projection Training plates which we devised.[4] Fixation and projection seemd very good from the start. The patient came for training

daily and spent between one-half hour to an hour each treatment period. At the beginning, binocular retinal stimulation was made a fixed part of the training procedure and on June 20, 1939, calisthenic and monocular fixation training were added. On July 5, calisthenic training was started on the Squint Korector, at first using prisms with Base-Apecies horizontal; afterwards changing them to vertical. This procedure was given to vary the program. In addition, monocular fixation training with a red glass filter over the right eye, retinal stimulation and tracing with alternate eyes were continued.

On August 17, 1939, in addition to the training procedures heretofore given, the patient was started on reading training monocularly, with Betts and Gray reading cards. He read the Gray Pre. No. 1 card with the left eye in 20 min. and with the right eye in 10 min. At this time also his lenses were changed to O.U. —75 Sph. to be worn constantly for one month. On August 23, 1939, reading was much improved.

Calisthenic exercises were given with base-in prisms of varying powers; starting with 3 prism diopters O.U. He was also given Base-Out calisthenic training which was alternated with base-up and down prisms. The Squint-Korector was used for these exercises. Retinal correspondence by the After-Image test was at this time found to be normal. The training steps outlined were continued until September. At this time he read a whole page in one of the story books in three to five minutes with very few errors.

On October 20, 1939, the patient was able to maintain superimposition at 20 prism diopters base-out. Near point reading using Gray Pre. No. 2 card (this is a second grade card) was much improved. On November 2, accommodation training was started. Minus spheres and books similar to those used at his school, as well as others were used. Superimposition continued to be easy and quite high. Rotational, in addition to horizontal prism exercises both base-in and base-out were given. He also was given training with vertical prisms. On November 14, 1939, tests were made to determine the presence of cyclophoria. This condition was found to be absent after repeated tests.

Training was continued with Keystone Hyper-exophoria calisthenic cards, with and without supplementary horizontal and oblique

prisms. On December 24, 1939, fusion was at 25 prism diopters base-out without effort. On January 5, 1940, the boy brought home a report card from school which indicated that he was on the honor roll. Training was continued until February, 1940, when a re-check was made in order to determine the binocular functions. The eyes appeared straight when looking in the primary position, but when looking down towards the floor, the left eye turned slightly out and up. The same was manifested when the boy had a cold.

Figure 5. Patient L.R. Age 10, June, 1941.

On February 22, he was given O.D. 6 prism diopters base-in; O.S. 8 prism diopters base-in to be worn constantly for two weeks in place of the —0.75 D. spheres. Static skiametry indicated no change from the findings of the first examination. On February 26, 1940, a pair of +1.00 D. Sph. in a fit-over were added to the prism correction during that treatment. This combination reduced his vision to 20/60 O.U. On March 29, 1940, the boy was given as permanent correction O.U. 5 prism diopters plano prism, base-in for constant use, except during training. Reading training was continued. The Wells Phoropter and cards were used for calisthenics. The training program at this time consisted of (1) Near point reading. (2) Calisthenics, both horizontal and vertical; horizontal and oblique. (3) Fusion and duction training. (4) Fixation and projection training. (5) Association and attention training. This was continued until June 13, 1940, when illness pre-

vented the writer from seeing this patient until the middle of July. At this time, a re-check of the visual functions was made and these were found to be satisfactory. The patient was tentatively discharged until September 9, 1940.

On September 9, 1940, an orthoptic re-check was made and the following data obtained: V.A. 20/20 O.U. Keystone Progress Fusion Cards—100% fusion.

It was difficult to obtain measurements of the existing muscular abnormality either objectively or subjectively. Both eyes appeared straight. There was no sign of suppression. Retinal correspondence by the After-Image test was normal. Reading at the near point was fairly good. We arrived at the conclusion that this function depended a good deal upon the boy's attention and care. The mistakes that he made clearly indicated that they were not due to faculty binocular coordination or association but to carelessness and inattention.

The training program already outlined was continued. Reading was given on the Keystone reading cards,—"Boots and his Brothers" was the first of the series used. The patient read these cards well. His work in school continued to be very good. He was then in the third grade. In addition to reading, the boy was getting superimposition, fusion and stereopsis training. Stereopsis was found to be extremely poor. Fusion, however, was good. On October 18, 1940, he was again discharged for one month with the instruction to wear his glasses on alternate weeks. No home work was advised.

The patient returned November 18, 1940, and reported that during the greater part of the month his left eye was somewhat deviating. After some training, however, fusion was easily maintained at 5 prism diopters base-out without the slightest effort. Superimposition, duction, fusion, and stereopsis development training calisthenics, and reading were given variably from this time until January 17, 1941. The phorias were measured and found to be orthophoric at distance, with orthophoria tending to exophoria at near. He had 100% fusion on near and distance, using the Keystone Progress Fusion Cards. The boy had fairly good stereopsis and both eyes were perfectly straight. Upon extreme exertion only, the involuntary oblique (outward and upward) rotation (ex-cyclovergence) of the left eye was apparent. It continued to be in the form of a skew deviation.

The patient was again discharged for one month and was instructed to use his glasses all the time. He returned on February 17, 1941, at

which time he had a severe cold and also a slight hyperexotropia without his correction. Some training on the Rotoscope restored the muscular condition to normal. Training was given with the No. 5 targets placed at orthophoria and increased to 10 prism diopters base-out. He was also given calisthenics on the Keystone Telebinocular. In a short time his eyes became straight and remained so.

Figure 6. Patient L.R. Age 10, June, 1941.

After this training was completed, a re-check was made of the fusion faculty. The patient was able to fuse at 20 prism diopters base-out, without effort. Accommodation training was continued with minus lenses which were increased to —4.50 D. Sph. O.U. Fusion, reading, and vertical as well as horizontal calisthenics were given. On April 11, 1941, the patient was again discharged for one month. Prior to his discharge, an orthoptic routine check-up was made and the following data obtained: Distance phorias: 4 prism diopters exophoria, and 2 prism diopters left hyperphoria (questionable). At near: 2 prism diopters exophoria only. The hyperphoria was manifested when the vertical phorias were measured with a single prism 15 prism diopters base-in. However, it could not be verified either with a Maddox Rod or with any other apparatus. The near point of convergence by the push-up test was to the tip of the nose. Retinal correspondence by the After-Image test taken at 16 inches and 6 meters was normal. Far point adduction 13 prism diopters: abduction 9 prism diopters. Super and infraduction was not easily determined. Fusion at the near and

distance was easy and he showed no indication of involuntary oblique rotation of the left eye or any muscular deviation. Figures 2, 3, 4 and 5 show the patient as he was in June, 1941.

This case will require periodic check-ups and probably occasional additional training.

OBSERVATIONS AND CONCLUSIONS:

1. By all tests, the patient had demonstrated that he lacked completely the reflex for spatial perception and the oriental reflex of fixation. This was manifested when he was asked to look at the page of a book held at about 14 inches. His right eye would look directly at it, but the left eye instead of fixating as is natural in convergence, would diverge and turn out obliquely (cyclotorsion). When his eyes were directed straight ahead, they invariably assumed a position of parallelism; after a while, however, there would be alternating exotropia, but no oblique rotation, even after extreme exertion. All these manifestations seemed to be compatible with the absent attention-association reflex which the boy manifested at the beginning of the training and for a long period thereafter.

2. This case, like a preceding one, seems to prove the unreliability of the retinal correspondence test by the After-Image[3] method as a prognostic test in strabismus. This patient showed doubtful retinal correspondence by the After-Image test at the start, but after some orthoptic training it appeared and remained normal.

3. That in this case the strabismus was not responsible for the reading disability was clearly demonstrated both at the beginning and throughout the course of training. In the writer's judgment, strabismus has yet to be proven as a direct or as a contributing cause of reading disability. A possible contributing cause for this patient's difficulty in learning to read may have been the whooping cough, coming as it did in this case at the age when these functions are being developed. It is possible that in the course of this illness something had occurred to disrupt the normal development of the attention-association reflex. Learning to read being so much dependent upon these two functions, its development was arrested in its incipiency, when no attention-association reflex was manifested, or in its early stage of development.

4. The manifestation of the oblique muscle disturbance at near could not be described as a cyclophoria or cyclotropia, per se. Subjectively, all tests indicated the absence of a cyclophoria or tropia either

at distance or near. Objectively, however, the involuntary oblique vergence could only be determined by observation and then only when the visual axes were directed to the floor. The writer tried several times to photograph this unusual muscular abnormality, but in all instances failed. Calisthenic training on the Keystone Hyperexophoria cards (C. Series) and the Tele-Eye Trainer with a No. 2 rotor seemed to help. At the time the boy was discharged, both eyes appeared normal in all positions.

5. The fact that the patient could either superimpose or fuse without the slightest effort as much as 60 prism diopters, base-out, and the fact that his convergence near point by the push-up method was to the very tip of his nose, indicate high fusion and convergence amplitude. Yet, despite this, the boy relapsed into periodic divergence (albeit of small degree, and then only when no prismatic glasses had been worn) every time he was discharged from training. However, the ease and speed with which binocular coordination was restored, suggests that the relapse may not have been of a functional nature and could have been avoided, had the patient made the slightest effort to maintain the binocular coordination developed by training. He was aware of the eyes deviating. In fact, he could induce the phenomenon at will.

6. The rareness of this case lies in the peculiarity of the various objective and subjective clinical observations, manifestations and phenomena which the patient had demonstrated. Suspecting possible malingering, all tests were repeated on different instruments with different test objects and at different times. Yet, they all indicated consistency. And while some did not tally exactly, the variations demonstrated were not of such extent as to warrant suspicion.

7. The chief complaint, that of reading difficulty, was eliminated by training and arrested association-attention reflex. To me this suggests an additional factor for consideration as a cause for reading difficulty.

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A STUDY OF FORTY-EIGHT CASES OF CONVERGENCE INSUFFICIENCY AT THE NEAR POINT*

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INTRODUCTION

One type of orthoptic case frequently encountered and very likely to respond favorably to visual training is that of convergence insufficiency at the near point. The syndrome typifying this case consists of a low positive fusional reserve, an insufficiency of accommodative-convergence, a low negative relative accommodation, and a chief complaint of asthenopia, or ocular fatigue after application to close work. Needless to say, all cases do not manifest every component of this syndrome.

Usually the occupations of these patients are such as to require prolonged use of the eyes at the reading plane. Since almost all patients referred to the Orthoptic Clinic at the University of California were college students, whose continued status as such depended upon lengthy application to reading material, an excellent opportunity was afforded to observe this type of case before, during, and after orthoptic training.

CHOICE OF SUBJECTS

Patients were all students at the University of California, referred to the Orthoptic Clinic from the regular Optometry Clinic. The average age was twenty-two years, and the range was from seventeen to forty-one years. There were thirty-one male and seventeen female patients. In all cases the sole basis of referral to the Orthoptic Clinic was a low positive fusional reserve, whether or not accompanied by the other components of the syndrome as mentioned previously.

FINDINGS PRIOR TO TREATMENT

Before orthoptic treatment was instituted each patient was subjected to a complete optometric examination. Refractive errors of any magnitude were corrected by the prescription of lenses.

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*Submitted on July 7, 1942, for publication in the February, 1943, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

At the time of this first examination 61% of the patients manifested an ametropia of 0.75 D.S., or less, and no lenses were advised. In 11% of the cases the refractive error exceeded 1.00 D.S., and lenses were prescribed at this time if they were not already being worn. A cylindrical correction was indicated in 13% of the cases. In half of these the lens required was less than 0.50 D.C. and corrective lenses were not prescribed. In the remaining half of these cases the cylindrical correction exceeded 0.50 D.C. and lenses were either advised or were already being worn. An unequal or different state of refraction in the two eyes (anisometropia or antimetropia) was manifested by 15% of the patients. The average difference in the refractive state between the two eyes of these patients was 0.87 D. and ranged from 0.50 D. to 1.25 D. Wherever this difference exceeded 0.50 D. correction lenses were advised.

At the time of the first examination 85% of the patients described symptoms of ocular discomfort or fatigue. The remaining 15% of the patients had no discomfort at all and had merely visited the Optometry Clinic for a routine eye examination. Due to low positive fusional reserve, these patients were referred to the Orthoptic Clinic for appropriate orthoptic training. The most frequent chief complaint at the time of the first examination was "eyes tiring and sleepiness after doing close work for any considerable length of time." Eighteen patients, or 38% of the total number in this survey, manifested this symptom. Twenty-five per cent reported "headaches after reading" as a chief complaint, and 18% of the patients complained of "aching, burning, stinging, tearing eyes after close work." In 4% of the cases the only complaint was an "occasional quivering or twitching of the lids."

A high correlation between severity of symptoms and subnormal findings for the positive fusional reserve was noted. It must be borne in mind, however, that the patient's complaint is a subjective reaction and, hence, has all the inherent faults of any subjective reaction. Furthermore, as expected, wherever individual differences are encountered, exceptions to this tendency were noted. One patient whose positive fusional reserve was 6△/—4△ reported no discomfort whatever, while another patient who exhibited a positive fusional reserve of 24△/8△ complained of eyes tiring after an hour or less of reading. Despite these and other similar exceptions, the trend in general was for patients exhibiting a zero or negative recovery point for the positive fusional reserve to have more severe symptoms; and for those patients having low recovery points (but of a positive nature) to complain of fatiguing after longer

application to close work.

In addition to subjective reactions on symptoms and objective measurements of the positive fusional reserve, measurements of the following were also taken before the first treatment was given: Phoria, adduction, fusional convergence, negative fusional reserve, and positive and negative relative accommodation. This data will be found in Table I. It is well to note here that while these averages show certain definite trends, an average must always be interpreted with care. In order to show the wide variations possible, the range of all findings has also been included in Table I.

TABLE I

MEASUREMENTS BEFORE TREATMENT

Test:	Average	Range
Phoria	1.25Δ Exo	4Δ Eso to 8Δ Exo
Adduction, Break	12Δ	7Δ to 35Δ
Adduction, Recovery	5Δ	0Δ to 16Δ
Fusional Convergence	—8.5Δ	Central to —24Δ
Positive Fusional Reserve Break	12Δ	0Δ to 24Δ
Positive Fusional Reserve Recovery	2Δ	—10Δ to 14Δ
Negative Fusional Reserve Break	21Δ	10Δ to 29Δ
Negative Fusional Reserve Recovery	16Δ	8Δ to 24Δ
Positive Relative Accommodation	2.87 D.	0.75 D. to 4.50 D.
Negative Relative Accommodation	1.75 D.	0.75 D. to 2.50 D.

METHOD OF TREATMENT

In 75% of the cases the only instrument used in administering the treatment was a refractor. The patient was seated behind the refractor with his correction lenses in place. He was told to fixate a white reading card placed 40 centimeters in front of the cornea and in the center of which was a one centimeter black square frame containing fifteen thin vertical lines, the angular width between these lines equaling 2.5 minutes of arc at the 40 centimeter distance. The source of illumination was a 60-watt bulb in the goose-necked lamp attached to the refracting unit and placed about two feet from the card. The positive fusional reserve was then measured by increasing the amount of base-out prism before the two eyes by means of Risley prisms until the patient reported seeing two squares (break point). Then the prism power was reduced until the patient reported that he saw the two squares merge and become one square (recovery point). Since past experience has shown that good results may be obtained by using relatively low-powered base-out prisms, the prism used for treatment was approximately one-half the amount of the recovery point. Thus, if on a given day the patient's positive

fusional reserve was 10△/6△, the base-out prism used in that day's treatment was of the magnitude of 3△. It was found that the positive fusional reserve could be built up to a normal value without ever using a greater stimulus than 8△ base-out.

After the base-out prism was set in place with half the total amount before each eye, the patient was instructed to observe the target and report if at any time during the treatment he saw two instead of one square. If such occurred, the amount of base-out prism was decreased. An automatic flasher was then connected between the goose-necked lamp and the source of current. This flashing device was timed so that the light was on for three to four seconds, and then off for the same length of time. The patient continued to watch the target for two or three minutes while the light flashed on and off; after this the patient was instructed to close his eyes and rest for two minutes. In a typical half hour treatment five minutes was spent in adjusting instruments and taking measurements, fifteen minutes in actual treatment on flashing through base-out prism, and ten minutes in rest. Just before dismissing the patient for the day the power of the prism was gradually reduced to zero.

As stated above, the refractor was utilized in administering 75% of the treatments. In two-thirds of these cases the treatment was exactly as outlined above. In the remaining one-third the above technique was also utilized, but, due to an unduly low negative relative accommodation, spherical plus lenses of the magnitude of 0.25 D. below the negative relative accommodation were also placed before the patient's eyes, and if possible base-out prism, as well. In the event that the patient manifested a negative value for the recovery point of the positive fusional reserve and, consequently, could overcome no base-out prism, plus lenses only were used until the recovery point was of sufficient magnitude to allow prism treatment to be instituted.

The instrument used for 15% of the treatments was the Stereo-orthoptor, and for the remaining 10% of the treatments, the Roto-scope. Various targets were used and, wherever possible, slightly dissimilar targets which require stereopsis as well as fusional ability were employed.

The instrument was set on simultaneous flash, with medium sweep, or rotation. The selection of patients for treatment on the mechanical instruments was in most cases done in a random manner. In this way it was possible to determine whether treatment of these cases by mechanical instruments was superior to the technique heretofore outlined. Results

show that the cases treated on the refractor responded as readily as, or more readily than, those treated on the Rotoscope or Stereo-orthoptor in regard to both the disappearance of the symptoms and the increase of numerical values of positive fusional reserve.

RESULTS

The average number of treatments administered to each patient was eleven. The lowest number of treatments given to any patient was six, and the greatest number given to any patient was twenty. To those who originally manifested no symptoms, sufficient treatments were given to increase the value of the positive fusional reserve to almost the arbitrary normal value of 20△/12△.* The basis for dismissal as cured for those cases originally manifesting symptoms was a complete disappearance of discomfort and fatigue, whether or not accompanied by an increase in the numerical value of the positive fusional reserve. If the patient noted no improvement after twenty treatments, the above orthoptic measures were discontinued and deemed a failure in that case.

To aid in tabulating results, patients were divided into three categories: (a) Those who were completely relieved of symptoms; (b) those who noticed an improvement, but not a complete disappearance of symptoms; and (c) those who noticed no improvement at all. Thirty-seven of the forty-eight patients fell into the first category (a) at the time of dismissal from the Orthoptic Clinic. In six of the forty-eight patients there was a diminution of discomfort, but occasional fatigue, or asthenopia, was still encountered (b). In these cases the symptoms usually appeared only after two or three hours of close work, whereas hitherto the onset of discomfort had been almost immediately upon beginning to read. In five of the forty-eight cases no improvement at all was noted (c). It is of interest to note that two of these five cases were afflicted with nasal sinusitis.

The positive fusional reserve increased from the average value of 12△/2△ before treatment to 19△/13△ after treatment. It was noted that while an appreciable increase of the positive fusional reserve was accompanied by a disappearance of symptoms, a cessation of symptoms was not always accompanied by an increase in the positive fusional reserve. Thus, in all but one case where an increase of 10△ or more in the positive fusional reserve was noted, the symptoms also disap-

*The standard as stated in *Practical Optometry*, University of California Syllabus Series, by Finley F. Neal. Revised by Jack T. Hobson, August, 1938. Syllabus KK. University of California Press, Berkeley, California.

peared. However, in 18% of the cases the symptoms disappeared, and no increase, or an increase of less than 5△, was noted in the value of the positive fusional reserve.

The other functions which were measured before treatment was begun (see Table I) were again measured after the last treatment. The results of these measurements are found in Table II.

TABLE II

MEASUREMENTS AFTER TREATMENT

Test:	Average	Range
Phoria	0.75△ Exo	6△ Eso to 8△ Exo
Adduction, Break	17△	6△ to 30△
Adduction, Recovery	10△	0△ to 19△
Fusional Convergence	—6.7△	Central to —22△
Positive Fusional Reserve Break	19△	8△ to 50△
Positive Fusional Reserve Recovery	13△	2△ to 42△
Negative Fusional Reserve Break	22△	16△ to 32△
Negative Fusional Reserve Recovery	15△	6△ to 28△
Positive Relative Accommodation	3.62 D.	1.50 D. to 6.75 D.
Negative Relative Accommodation	2.25 D.	1.50 D. to 3.25 D.

A comparison of the data in Table II with that in Table I will reveal the effect of the treatment as outlined upon various functions. The value of the phoria does not change perceptibly as a result of base-out stimulation at near point. The value of the fusional convergence or near point phoria does change slightly, the average individual becoming 1.8△ less under convergent at the 40 cm. plane.

The adduction (target at infinity) increases from an average of 12△/5△ to an average value of 17△/10△, despite the fact that in treatment all targets were placed in the 40 cm. plane.

Contrary to the belief held by some that an increase in the positive fusional reserve decreases the negative fusional reserve, it was found that the average value of the negative fusional reserve was almost exactly the same before and after treatment. In many cases an increase in the negative fusional reserve was observed along with the increase in the positive fusional reserve.

As might be expected, since base-out prism and plus lenses were often used, the negative relative accommodation increased in value as a result of treatment. An average increase of 0.50 D. was noted. However, it is interesting to find that the positive relative accommodation also increased, and by a greater amount. The average increase in this measurement was 0.75 D.

CONCLUSIONS

In view of the fact that this is a primary survey where only 48 cases were observed, any conclusions are tentative. Also, since the patients were all university students of the same age group and of similar occupation, any trends noted in this study may be held as applicable only for such persons until other groups are investigated. All generalizations made in conclusion, then, are subject to these qualifications.

(a) A low value for the positive fusional reserve, and especially a low value for the recovery point is usually accompanied by eye discomfort or rapid eye fatigue when the individual is engaged in work demanding prolonged use of his eyes while fixating objects at the reading plane.

(b) A system of base-out prism orthoptic training which will increase the value of the positive fusional reserve seems to lessen the subjective discomfort and eye fatigue, and in the majority of cases causes such subjective symptoms to disappear completely.

(c) Orthoptic procedure as outlined here is of great practical value since the only instrumentation necessary is the refracting unit, and the beneficial results are subjectively observed by the patient.

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TRENDS OF PRACTICE*

Various proposals have been made for public health services. In general we have adopted the position that the community must take care of all individuals in it. That has always been the viewpoint of any truly civilized people. As a result of having adopted that humanitarian outlook, we have to carry it through to the logical conclusion. That means that patients who need attention and cannot pay for it, and the doctors who have but few patients are going to be brought together eventually and the community is going to foot the bill.

*An abridgment of a hitherto unpublished report, "Professional and Legal Aspects of Present Medical Trends," presented before the American Academy of Optometry.

Where do we, as optometrists, fit in such a program? The answer is, none too well. As is known, most of these proposals have originated with medicine, and optometry is not considered. It is also evident that in any health insurance scheme the men under that scheme must be able to do most things that can be done during the patient's visit. That is the opinion of many sociologists, who have given some thought to the problem. The legislative bodies of a number of States have introduced various proposals for compulsory health insurance. Now it is true that most of these plans were rejected but the proponents of the plans have nevertheless succeeded in educating many of the legislators, until with further education the plans have come to be looked upon as inevitable. One such proposal would provide for compulsory health insurance for about eighty per cent of the population, all eye care to be given by physicians.

Agitation for such programs is going on all over the country and in many of the Western States the medical societies have definitely lined up in favor of the medical insurance schemes. They ask only full control of them.

What does this mean to the average optometrist? With the exception of a few men, optometrists draw their patients from the lower income groups, affected most by these plans. What course will be open to the optometrist if thus deprived of his patients? It might be possible for him to fit under that program as a dispenser of glasses—although one such bill presented in the Pennsylvania legislature provided that the physician was to provide medicine, trusses, glasses, medical appliances, etc. The writer hardly thinks that many optometrists could bring themselves to the point of becoming opticians. Yet here is something in the offing that bids fair to offer us the alternative of becoming opticians or of finding some other field of work.

Someone has said, "Let the American Academy of Optometry or the American Optometric Association demand that optometry be included under these health insurance schemes." The answer to that proposal is the fact that insurance organizations may not consent to this, because under present conditions it would mean that there might have to be two visits for one service. In other words, if a patient with an ocular pathology or in need of ocular surgery happened to go to an optometrist, the optometrist would not accept the case,. Therefore he would have to refer the patient, making two visits necessary and from the insurance standpoint, it would be a difficult situation, as actuaries see it.

A consideration of these factors stimulated an investigation into the question of the exact position which the optometrist holds in the field of eye work. The writer has a file of copies of editorials that have appeared in ophthalmological publications, or in journals of the American Medical Association, and in addition, reports from other sources. The writer has also been in contact with some of the ophthalmologists, themselves, and we have the opinion of their leaders on the problem of eye work. It is generally considered that optometry exists because ophthalmology does not meet the needs of the patient.

That means that if ophthalmology were in a position to adequately fill the need in eye work, we might as well consider that there is no point in going on in optometry. If, however, the ophthalmological group were not in a position to develop properly the field of eye work, then it might be possible for an optometrical group to occupy and develop that field.

The medical literature stresses the fact that the average ophthalmologist is not prepared for the work he is doing. These are ophthalmological opinions, for the most part, and they make it clear that ophthalmology, like dentistry, has a peculiar position in the field of medical specialties: it requires *instruction in a special body of basic knowledge,* not merely a special application of general medical skill and knowledge.

The literature further shows that, in the opinion of men who have attained a high position in the field of ophthalmological study, if medical man are going to continue the practice of eye work, some adequate training must be found.

Now if medicine has had an answer for this situation, we, as optometrists, would not be here today. Medicine has had no answer. Their avenues of approach have been investigated and actually tried. Ophthalmological leaders have said, "It is obvious that the medical graduate is not competent to practice ophthalmology. Let us see if we can train him in the pre-medical years." That was tried in the University of Rochester, where the optometry courses were to be so used. The plan failed. The course was too difficult, and secondly, a basis of physiological chemistry was needed and this course was given in the medical school after the completion of the fundamental work in physiological optics.

A plan that has been tried before and which is occasionally proposed today by uninformed physicians, is that of modifying the funda-

mental course in the medical school—substituting, for example, physiological optics for obstetrics. This is not in accord with medical tradition and policy, and consequently has met with powerful resistance from the medical educational council.

The third course open is to try to force the physicians to take graduate courses in ophthalmology and state board examinations to be followed by the issuance of a special medical license. This would mean placing a legal limitation on the practice of medicine—a thing consistently rejected by that profession. The only other control would be through the code of ethics. This cannot be attempted, however, because it would deprive some medical men of the right to do certain things which optometrists can legally do.

Medicine can therefore do but little about the problem.

What about optometry? We have the most extraordinary diversity in background and preparation, and also we have the most extraordinary diversity in ability and economic viewpoint. We have, loosely, two classes of professional groups that we represent. (1) The old-time optometrist, a perfectly honest and a good businessman. This group thinks in terms of merchandise and glasses. (2) The strictly professional optometrist with whom professional service is primary.

Among the members of the professional group, we have an almost unanimous opinion that we should continue to develop our education. That is natural since we are committed to the idea of service. But we have two viewpoints as to how that principle should be applied. One group thinks we should make no legal effort to do anything except what we are now doing and have done since time immemorial, but that we should learn more and more about that, and should raise the time requirements in the schools, in order to create better informed men. The other group in this professional division also believes we should have more education and better preparation, but that as we receive that better education and greater preparation, we should be permitted to practice that which we have become prepared to practice.

The majority of new and younger professional optometrists have financial problems. So do some of the older group who, by virtue of ability, should have no concern with financial matters. There is a group of practitioners, to be sure, whose practices have run over a long period of years, who have been fortunate enough to obtain an ample following. The younger men find establishing a practice disproportion-

ately difficult. From this standpoint professional optometry is in trouble today.

Furthermore, the public confuses the optometrists with the ophthalmologists. Your patients may never have heard that term, but they regard you as eye doctors, as they understand those words: you have an office, you look like doctors, you act like doctors, you treat them for what is their most serious eye trouble in most cases, and to them you are doctors and they expect you to do all the things an eye doctor would do. They are sadly nonplussed when they present themselves in your office with a surgical problem and you refuse to do anything for them.

Another thing that rises to plague the optometrist is that he does not use cycloplegics. This is sometimes used to discredit the optometrist in non-optometric propaganda.

This leads us to analyze the expression, "the field of optometry." Have you ever considered what that field is? It is only a part of a part of a field. Optometrists do not have a field. Optometrists say that refraction is their field. It is not, unless you are utilizing every accepted method in the field of refraction. Furthermore, refraction, although it is as a matter of percentage a large part, nevertheless is only a part of the field of eye work.

Here, then, is a field of work that is wide open. Ophthalmology is inhibited by its development, by the development of certain educational concepts and by present day medical training. Optometry is inhibited by the mill stone of mechanics which weighs it down and by certain legal restrictions. There are other groups not so inhibited. Psychology today is beginning to pay a lot of attention to the field of eye work as a possible outlet for clinical physiological psychology. Much thinking and excellent work is being done and directed by psychologists. Physiologic optics courses are being offered by psychologists. Has it occurred to you that in the three graduate schools of ophthalmology the courses are given by psychologists?

I do not want to give you the idea that things are entirely wrong within optometry. There is a problem, however. We may ignore the problem and may still get along, but on the other hand, that problem may close up on us in the very near future and, in my judgment, the problem requires serious study. —Edwin Forbes Tait.

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

by J. Fred Andreae, Secretary

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

OPTOMETRY LOSES A FRIEND

DR. WILLIAM W. UPDEGRAVE PASSES AWAY IN HARRISBURG

One of the best friends optometry ever had, and certainly one of its hardest workers, left his friends quite suddenly Saturday evening, December 19th, at the Penn-Harris Hotel, Harrisburg, Pa. Dr. Updegrave, 75, had just arrived in Harrisburg from his home in Johnstown, for the special meeting of the Board of Directors of the Pennsylvania Optometric Association. He had been in fine spirits during the trip on the train from Johnstown to Harrisburg, being as usual, "the life of the party." While his collapse in the hotel was sudden and without warning, and because of this, a shock to his friends, it was undoubtedly an end which Dr. Updegrave himself would have wanted—without pain or suffering, and "with his boots on" to the last.

Son of a pioneer Johnstown merchant who conducted a store at Clinton and Locust Streets, in what is now known as the old Updegrave Building, Dr. Updegrave was born on February 18, 1867, son of William K. and Mary J. (Sittman) Updegrave. His grandfather, Reverend J. R. Sittman, was the first presiding elder of the Allegheny Conference of the United Brethren Church. His ancestors came to America from Holland in 1682 and located in Germantown, Philadelphia. Dr. Updegrave attended Johnstown High School, and graduated in 1893 from Chicago School of Optometry. That same year he began to practice as an optometrist in Johnstown.

Dr. Updegrave was the organizer of the Johnstown Optometric Society. As a member of the American Optometric Association for the past forty years, he has attended twenty-five of the organization's annual conventions, most of them in company with his old friend, Dr. William J. Van Essen. In addition, he held honorary fellowship in the Institute of British Optometrists, and was a member of Beta Sigma Kappa Fraternity.

"Bill" Updegrave was always a fighter for the highest ideals of

the profession, and with that fighting spirit, combined an enthusiasm for the profession which was rarely equalled and never surpassed. He was interested in developing new methods of approach and was constantly working on various inventions to develop more efficient and skillful vision. His book, "The Seeing Eye," is well known nationally and he was also a frequent contributor to optometric journals.

For many years Dr. Updegrave had been actively interested in working with young people. He organized the Boys' Brigade, in Johnstown, and was associated with the Tiny Tim Club, a project for orthopedic treatment of crippled children. He was a charter member of the Kiwanis Club, and held membership in the Johnstown Chamber of Commerce, North Fork Country Club, and Oriental Council No. 72, Junior Order United American Mechanics. Dr. Updegrave's interest in sports began at an early age. He was a professional roller skater and ice skater in his early days, and in recent years spent much time on the golf links, often in company with his many Pittsburgh friends.

Dr. Updegrave leaves his wife and two daughters, Mrs. Harold O. Weaver, of Windber, and Mrs. George M. Auman, of Ferndale; three grandchildren, William Weaver, now a student at the Pennsylvania State College of Optometry, and Paul and William Auman; two sisters, the Misses Edith and Tillie Updegrave.

H. Ward Ewalt, Jr.

CORRESPONDENCE

ON FELLOWSHIP IN THE ACADEMY

New York, N. Y.
December 21, 1942

To the Editor:

The American Academy of Optometry should do all in its power to help those men who are now coming into the A.O.A. and those who are already members of the A.O.A. to practice in a professional environment. When this is accomplished they should be sought to join the Academy.

But the present set-up of the Academy is not one that would give it much power or create much incentive to accomplish this.

I have always believed that the Academy should have been doing

what the A.O.A. is now doing, i.e., increasing its membership and after getting the men in who are eligible, creating the desire on the part of those men to strive to better their own professional standing. This to be accomplished by developing a real workable program within the Academy and arranging definite substantial assistance.

The Academy should not put any unnecessary obstacles in the way of men becoming members and should eliminate the present examination barriers, and should be seeking out and welcoming into its ranks the many hundreds of men who are practicing in a professional environment. (The Academy should become alive and vital and active and helpful in helping those men on the border-line, should cease being a holier-than-thou aloof organization.) Proper environment with a man of character and training should alone entitle him to membership in the Academy.

We all know in our hearts what "proper professional environment" means, but are loath to come out openly and frankly when approaching those well qualified men in our ranks, some in high places, who fail to go the one necessary step and present Optometry to "their public" in a professional environment.

That "proper professional environment" which does not permit or tolerate stores, no matter how camouflaged, no matter how deneonized, no matter how small the sign.

Proper professional environment does mean practicing Optometry in the same manner that the *public* and thereby government agencies recognize as the proper setting for all its professional advice and services.

When the Academy had this greatly increased membership it could gradually build them into a formidable group of really professional men.

It would then be the nucleus of what eventually would be accepted by the public as a profession.

There is much to do along educational lines in order to prepare Optometry for a Degree that will meet the necessary standards set by proper authority and applying to other recognized professions.

This phase is under the able leadership of men like Sheard who have a real conception of what is necessary and vital to do along these lines and it is high time that Optometry understand and get behind these efforts. The Academy should be foremost in helping this effort.

But cleaning up our own back-yard does not have to wait upon this. We should, as an Academy, be out and helping in an articulate and non-criticizing way all optometrists to present Optometry in a uniform

that is the same throughout this vast country, as a profession interested solely in the nation's eye welfare.

Elmer E. Hotaling.

ON THE PSYCHOLOGICAL APPROACH TO OCULAR WORK

Hanover, New Hampshire
November 25, 1942

To the Editor: Thank you for sending me your reprint A PLAN FOR REFRACTIVE EYE CARE FOR THE INDIGENT AND THE MEDICALLY INDIGENT IN MINNESOTA. It certainly is very interesting and you have done a nice piece of work. I hope it will serve as an example to optometrists in other states.

Receiving your reprint reminded me of your request to write an editorial regarding the work done in psychological laboratories pertaining to eyes and their function. When you spoke to me about this in Chicago in December, 1941, I remarked that I could not see how I could accomplish what you desired since to do the job well would take an enormous amount of time. I suggested you find someone more suitable for the task, but, nevertheless, you insisted that I at least make a try at it. I now submit that I have failed you in this assignment and offer, besides my own inadequacy, the fact that I have been extremely busy since last December. Before I conceded that the task was completely beyond my scope I spent several week-ends scanning the various 1941 psychological journals (the Dartmouth library has, at least, thirty monthly journals in the field of psychology). Eventually, I decided that my time was poorly spent because most of the articles were on subjects other than eyes (or vision) but, nevertheless, I was attracted to reading them and I found that I was spending considerable time on matters not pertaining to the goal. In an attempt to confine myself to psychological literature concerning eyes (and vision) I decided to have recourse to "THE PSYCHOLOGICAL ABSTRACTS."

You can readily realize that the papers referred to by "THE ANNUAL (1941) INDEX OF THE PSYCHOLOGICAL ABSTRACTS" represent a wealth of material possibly of interest to optometrists but for anyone to cover adequately this list of references would be indeed a momentous task. If the clerical help were available it would be ideal if the authors, the titles of their papers, the sources of publication, and a summary of the

papers could be compiled. Unfortunately, I have not the time nor the help available to do this.

Your purpose in suggesting a coverage and review of psychological literature pertaining to eyes and vision may rightly have been encouraged by the recent trend of many optometrists to forsake their earlier training in anatomy, physiology, and physics for the "modern" concept that vision is primarly, and solely, a mental or psychological problem. It is true that the psychological aspects of vision have too long been neglected by optometrists, in general, but the tendency to account for *all* ocular idiosyncrasies, including errors of refraction and motility, on cerebral patterns, concessions, interferences, and other psychological interpretations is as unscientific as the optometrists' previous complete neglect of the influence of *any* psychological factors. We still measure (and prescribe) for ocular anomalies in terms of *physical* units (the metric diopter and the prism diopter), and although we must recognize the psychological factors as incidentally important, in the final analysis we prescribe for a physical condition, rather than a psychic one, in the vast majority of cases.

The work of psychologists is largely concerned with observations or *normal* eyes and not with the observations and symptoms peculiar to one with errors of refraction or motility. This fact should be recognized by refractionists and conclusions in regard to prescribing for abnormal eyes should not be drawn exclusively from the investigations made by psychologists on subjects with normal eyes. Robert E. Bannon.

INQUIRY AND EXPLANATORY NOTES

Through this department answers to technical questions dealing with orthoptic or refractive problems will be presented. These answers here published have been prepared by competent experts. Inquiries on postal cards and anonymous communications will not be noticed.

WHEN THE VISUAL FIELD SHOULD BE CHARTED

To the Editor: The statement is made that the visual fields should be charted at the start of an examination, and we assume this to be correct, but in what cases should this be done?

W. T. A., Washington, D. C.

Reply: Although in theory the field should be charted as often as

the visual acuity is recorded, owing to the time involved it is not always practicable.

With the qualification that the physiologic blind spot should always be charted when the patient is over forty-five years old, complete fields usually need only be recorded when certain definite types present themselves.

It is certainly advisable to chart the field:

1. In all cases where vision is below normal and cannot be restored by refractive method.

2. All suspected cases of ocular pathology.

3. All cases of persistent headache.

4. Cases where the patient's complaint is greater than the refractive error would seem to justify.

5. Cases in which ocular discomfort persists after the correction of refractive error.

6. All cases where the patients describe obvious subjective disturbances in the field.

7. Cases which seem to involve migraine. Migraine cases are exceedingly interesting from a research standpoint and are well worth the time spent on them. It is a subject in which the sum of human knowledge is comparatively small and one which is usually very distressing to the sufferer.

BOOK NOTICES AND REVIEWS

Books received are acknowledged by notices in this department. Special selections will be made for more extensive review in the interest of our readers as space permits.

CONTACT LENSES, Theodore E. Obrig, A.B. Published by Obrig Laboratories, Inc., 7 East 48th St., New York City. 470+XIII pages, illustrated. Cloth. 1942.

In this most complete treatise the author discusses all types of contact lenses from that designed by Hershell as far back as 1827 to the modern all-plastic molded type which is available today. Although research has been carried on in this field for over 100 years, it has only been within the past four decades that any practical progress has been made. The early lenses were blown by a technique similar to that used

for making artificial eyes and were obviously crude in both scleral fit and optical accuracy. This technique was later refined by means of molding from casts of the eyeball and the corneal portion was ground to accurate curvature.

After considerable experimentation with the latter type of lens through the Zeiss Company, the author developed a contact lens composed of a synthetic plastic resin known as polymethyl methacrylate which, although having much the appearance of glass, is 60 per cent lighter in weight and non-shatterable. While Feinbloom and others had also experimented with similar plastic materials for the scleral portion, considerable difficulty had been encountered in fusing the glass corneal portion. Obrig overcame this problem by developing a technique for grinding the corneal portion out of the plastic material itself which resulted in a one-piece wholly plastic lens.

Considerable space in the book is devoted to a frank analysis of the difficulties encountered in fitting. These involved the corneal portion mostly and more especially the limbus. Most of the early lenses were supplied with too small a corneal area which the author claims should be slightly elliptical in shape, not round as was originally assumed. By molding the scleral portion to fit the globe and allowing adequate clearance at the corneal margin most of the usual difficulties are said to be avoided.

Obrig goes into considerable detail regarding the Stevens' technique of molding which employs a material known as Negocoll that was originated by Dallos in Budapest approximately ten years ago. This substance is a tan-colored elastic hydrocolloid with an agar base which is heated and then cooled to slightly more than blood temperature when applied to the globe by means of a plastic molding shell. In using a local anesthetic the author warns against either cocaine or 2 per cent pontocaine being employed because of an unfavorable effect upon the corneal epithelium. He reports that he has found a 1/2 per cent solution of pontocaine satisfactory in about 80 per cent of his moldings.

A positive model of dental plaster is then cast in duplicate from the Negocoll negative and the semi-finished contact lens is made from one of them. The other is kept as a permanent record of the molding. The physical fit of the semi-finished lens is made by means of direct observation with 1 per cent fluorescein placed between the lens and the eyeball and viewed through a cobalt-blue filter. After refraction with

the semi-finished lens in place the exact power is ground into the corneal portion.

The author discusses the problem of finding a satisfactory buffer solution or liquid lens which is said to act merely as an hydraulic shock absorber and to hold the lens in place. It seems that no one solution has yet been found that is universally acceptable on account of such variable factors as the chemical composition, hydrogen ion concentration and relative osmotic pressure. Contrary to what one might expect, the tears are not satisfactory for this purpose but should be more alkaline. The chief difficulties which have been encountered concern clouding of the fluid and irritation after a few hours' wear. He reports the best results so far with the Feldman solution although considerably more research apparently needs to be done to perfect this phase of the work.

On the whole the volume impresses one as being a very comprehensive survey of the field and is much more readable than its technical contents would indicate. Obrig introduces the subject with a chapter on the anatomical factors involved and gives a surprisingly long list of ophthalmic and occupational uses for this type of lens. He suggests from his own experience that the handling of subnormal vision cases should not be considered complete without the application of a trial contact lens through which refraction can sometimes be radically improved. Every refractionist would seem to be well advised to have at least one average sized trial lens available for this purpose. The author stresses the improvement in vision possible in cases of strong myopia because of the enlargement of the retinal image in contrast to the diminution in size caused by spectacle lenses of equivalent power.

While Mr. Obrig appears to take an understandable pride in the advantages of his own particular type of lens, he does not fail to mention others which are available and even includes copies of the patents on the other kinds in the appendix. It would appear from the reviewer's experience that once the vexing problem of an adequate buffer solution were overcome contact lenses of a molded plastic type would enjoy widespread use.

Arthur B. Emmes.

ABSTRACTS

A department in which will appear abstracts of the literature of optometry, ophthalmology and applied optics. These will be classified according to the following list, although contributions to all sections will not necessarily appear in each issue.

1. Ocular Refraction.
2. Physiological Optics and Color Vision.
3. Ocular Muscles.
4. Orthoptics and Reading.
5. Anatomy, Histology and Embryology.
6. Ocular and General Pathology.
7. Ophthalmic Lenses and Material.
8. Instruments.
9. Hygiene and Illumination.
10. Applied and Physical Optics.
11. Education, Sociology and Economics.
12. Miscellaneous.

12. MISCELLANEOUS

OPTOMETRY IN THE ARMY. Gibner, H. C. Iowa Optometrist, 1942, 20, 3, 8-9.

The author of the following data is the Chief Surgeon of the U. S. Army, Seventh Corps Area. This material is an abridgment of a communication having to do with the role of an optometrist inducted into the Army. The procedure seldom requires the soldiers retention at an induction station for more than 48 hours. He is then transferred to a reception center, where he is classified. It is the duty of the classification officer to interview soldiers and cause to be recorded on each man's record an occupational specialty number which identifies the soldier's occupational specialty. If the specialty is one of those considered suitable for the medical department, as would be the case with an optometrist, the soldier, after a short stay at the reception center, is transferred to a medical replacement training center where he receives his basic military training. This takes from eight to thirteen weeks.

Upon completion of training at the medical replacement training center, the soldier is transferred to his permanent station, which may be any organization at which the services of a soldier with his qualifications can be used to advantage and which organization has requested the assignment of a soldier with those qualifications. These requisitions are processed through the office of the Adjutant General, which authorizes the shipment of soldiers from replacement training centers as loss or filler replacements to newly activated units or to other organizations with incomplete complement of enlisted personnel.

After arrival of the soldier at the organization to which he is to be permanently assigned, he may submit an application for selection as an officer candidate. A candidate must have a minimum of three months' continuous active service or six months total accumulated service within

the last twelve months immediately preceding the date of the opening of the course.

Approved applicants for a course of training at an officer candidate school, after selection by a board of officers convened for that purpose, are sent, in the case of the medical department, to the Medical Field Service School, where they receive an intensive three-month course which prepares them to assume the duties of a non-medical officer in the medical department of the Army of the United States.

Optometrists who enter the service are given equal opportunity with every other medical department soldier to compete for the privilege of attending an officers' candidate school; and if they have the qualities of leadership, initiative, and ability to assume responsibility, coupled with the necessary formal education and the personal integrity required of an officer of the Army, their chances of selection are good.

While serving as enlisted men, all soldiers in the medical department are given equal privileges in competing for increased grades and ratings. The fact that a soldier is an optometrist, a pharmacist or a male nurse does not entitle him *per se* to an increase in grade or rating, but the possession of these qualifications will be seriously considered by commanding officers in selecting and recommending enlisted men for promotion.—C. C. K.

THE EYES, THE WORK AND THE WORKER. E. H. Ridgeway. Associated Journal of Optometry, 1942, 7, 8, 14-15.

The author reviews the need for a program of visual safety and ocular conservation in industry. Figures are presented showing the actual cost to industry as the result of eye injury. Examples are also presented which show the production loss to industry as the result of visual fatigue, particularly in those activities in which much near-point ocular work is required. In some of these latter cases the loss in production runs as high as 25 per cent due to uncorrected errors of refraction. T. O. B.

CONSERVATION OF VISION IN TRANSPORTATION. H. Bartle. Pennsylvania Optometrist, 1942, 11, 1, 47-52.

The author reviews the physical and ocular standards required for applicants for railroad employment. The ocular examination includes tests to discover the refractive status of the applicant, as well as fundus changes, ocular reflexes and color vision. C. C. K.

EYE INJURIES IN INDUSTRY. Special Report. Optician (London), 1942, 103, 2655, 27-28.

This is a plea for an International Classification of the Causes of Impaired Eyesight and of Blindness as these result from industrial injury. The report points out that both American and British classifications have been prepared and were placed before the International Association for the Prevention of Blindness at Madrid in 1933 but nothing came of this. It is suggested that after the war another attempt should be made.

C. C. K.

OPTICAL PROBLEMS FACING THE NAVY. Ballard, S. S. Journal of the Optical Society of America, 1942, 32, 3, 123-128.

Optical instruments find many uses by the naval forces. Navigation instruments, rangefinders and other fire control equipment, gun sights, periscopes and cameras are needed in an ever increasing quantity. The greatest optical problem, facing the Navy today, is procurement. The Navy needs more optical equipment than can be produced by even this country's greatly expanded optical industry. The Navy appreciates the efforts of our leading optical manufacturing companies in the excellent efforts they are making to do their share to supply for national defense, and is encouraging these and other companies to further expand existing facilities.

The author of this report finds the present bottleneck is not so much in raw materials but rather in machinery and skilled men for producing the finished product. Machine tools are needed as are short-cuts and improved mass-production methods. Designs must be simplified and substitutes selected to speed up production.

The author is a Lieutenant (jg) in the U. S. Naval Reserve connected with the Research Division, Bureau of Ordinance. The paper contains a general description of many of the optical instruments now in wide use in the naval forces. C. C. K.

WAR AND PROFESSIONAL LEADERSHIP. Asgis, A. J. Columbia Optometrist, 1942, 16, 61, 2.

"Professional workers in every branch of healing, whether in medicine, dentistry, optometry, public health, etc., should, in my opinion, take their rightful place among the leadership in all progressive, political

and economic movements that fortify our democratic institutions and bring the fruits of science and art to the wider masses of our population."

T. O. B.

THE OPTICS OF STREET SIGNS. J. D. Spooner. Optician (London), 1942, 103, 2668, 246.

"Every few months so many square miles of white paint are distributed, patchwork fashion, over the streets of London, the provinces, and over the roads of Britain. The purpose of this paint is purely optical; it is placed there for visual guidance under certain conditions of illumination. Yet there appears to be little optical science used in its application, and because of this a great deal of it is ineffective; therefore wasteful." The author finds the horizontal black and white stripes, so frequently used, to be ineffective and of less value than a contrast outline marking which his experience indicates to have greater visibility. L. P.

VISION IN OUR ARMED FORCES—THE NAVY. C. A. Swanson. Pennsylvania Optometrist, 1942, 11, 1, 16-25.

The author is a Commander in the Medical Corps of the U. S. Navy. He points out that at present optometrists are stationed in our large training stations, where the ocularly unfit that have sifted in from the recruiting stations are further weeded out. He presents the 1942 visual requirements for the Navy and the Marine Corps. He also points out that in 1940 the Navy was forced to reject about 3 per cent of its applicants because of red-green color insufficiency; reject 8 per cent because of uncorrected errors of refraction and reject 0.3 per cent because of other visual defects. He then briefly presents some Naval data on (1) the effects of poisonous gas, (2) the effects of altitude on ocular refraction, (3) the effects of parachute jumping on the eyes, and (4) data on war injuries of the lids, orbits and eyeballs. C. C. K.

VISUAL OPTICS AND AIRCRAFT OBSERVATION. J. D. Spooner, Optician. (London), 1942, 103, 2663, 161.

The author suggests that those responsible for the training of air spotters and observers keep the following visual suggestions in mind. (1) The observer, in place of attempting to watch a faint moving object

with his foveal central field will find it well to keep his eyes stationary and watch the movement of the object with his peripheral field of vision, as it will be easier to keep it in view. (2) The observer should also remember that in watching a moving aeroplane that one followed by the eyes seems to move much faster than one merely observed by the peripheral field with the eyes stationary. So that in estimating the speed of aeroplanes that have moved well within the field of view, that the central foveal field must be used. (3) That depending upon a number of factors that aeroplanes become visible at from 20,000 to 50,000 feet.

T. O. B.

NOTICE OF OPTOMETRIC MEETING

MIDDLE ATLANTIC EDUCATIONAL CONGRESS

The Middle Atlantic Educational Congress is to be held in Pittsburgh, Pennsylvania, at the Hotel Roosevelt, March 28, 29, 30, 1943.

Feeling that the greatest need in Optometry today is that every optometrist be found adequate to the job of Visual Rehabilitation; to the solving of problems of Reading Readiness; and all those other problems attendant to skillful and efficient vision, the Middle Atlantic Educational Congress will schedule concurrent classes on Visual Skills, Visual Training, and Analytical Techniques.

This will be an excellent opportunity for the optometrist within traveling distance of Pittsburgh to spend three full days of serious work on modern optometric techniques and the latest thinking on the subjects of Visual Skills and Visual Training.

For details or hotel reservations write the office of the Executive Secretary, Pittsburgh Optometric Society, 7044 Jenkins Arcade, Pittsburgh, Pennsylvania.

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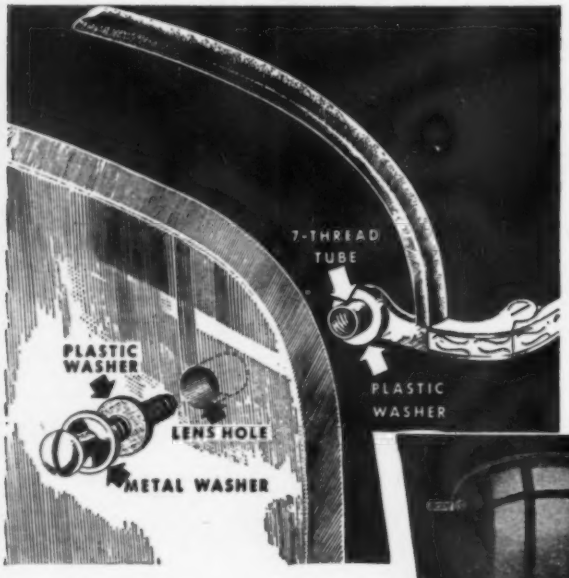

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—*Drs. Ryer and Hotaling in the Optical Journal, August 15, 1942*

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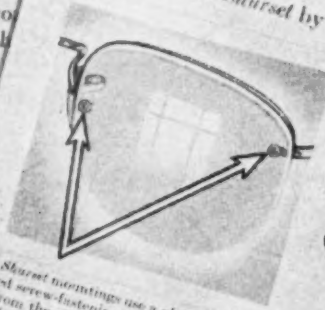

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